REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1-23 are in the case.

I. THE 35 U.S.C. §112, FIRST PARAGRAPH, REJECTION

Claims 1-3 stand rejected under 35 U.S.C. §112, first paragraph, on alleged lack of enablement grounds, as set forth in the Official Action mailed April 21, 2003. That rejection is respectfully traversed.

Claims 1-3 are fully enabled by the present specification. A person of ordinary skill would have no difficulty in carrying out the invention as claimed based on the disclosure and the level of ordinary skill in this art. In particular, one of ordinary skill would be aware of numerous catalysts and appropriate process conditions that would be suitable for the oxidation reaction zone and the second reaction zones of the integrated processes of claims 2 and 3. This is clear from the specification which, for example, discloses a number of references from which the person of ordinary skill may select catalysts for the oxidation of alkane to alkene and carboxylic acid (see, for example, page 5, line 29 through page 8, line 2). Thus, one of ordinary skill, as of the filing date of the application, would have been able to carry out the processes as claimed in the present application based on the disclosure and without the exercise of undue experimentation. Withdrawal of the outstanding 35 U.S.C. § 112, first paragraph, rejection is respectfully requested.

II. THE OBVIOUSNESS REJECTIONS

Claims 1, 4, 7 and 11-23 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 5,162,578 to McCain, Jr. et al in view of U.S. Patent 4,899,003 to Manyik et al. Claims 2, 3, 5, 6 and 8-10 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 3,458,406 to Fisher et al in view of Manyik et al. Those rejections are respectfully traversed.

The invention provides a process for the oxidation of a C_2 to C_4 alkane to produce the corresponding alkene and carboxylic acid. The process comprises contacting in an oxidation reaction zone, the alkane, molecular oxygen-containing gas, and the corresponding alkene and optionally, water, in the presence of at least one catalyst active for the oxidation of the alkane to the corresponding alkene and carboxylic acid, to produce a product stream comprising alkene, carboxylic acid and water. In the process, the molar ratio of alkene to carboxylic acid produced in the oxidation reaction zone is adjusted or maintained at a pre-determined value by controlling the concentrations of the alkene and optional water in the oxidation reaction zone and optionally by also controlling one or more of the pressure, temperature and residence time of the oxidation reaction zone.

Claim 1 requires that both an alkane, such as ethane, and an alkene, such as ethylene, are reacted with oxygen in the presence of a catalyst to produce both a carboxylic acid, such as acetic acid, and an alkene, such as ethylene. It has been found that the molar ratio of acid to alkene product can be tailored by controlling the concentration of alkene reactant.

Claims 2 and 3 are directed to the production of an alkyl carboxylate and an

alkenyl carboxylate respectively via integrated processes wherein stage 1 of the integrated process is the process of claim 1 to produce acid and alkene. The acid and alkene product are subsequently reacted in the presence of a suitable catalyst to produce an alkyl carboxylate such as ethyl acetate or an alkenyl carboxylate such as vinyl acetate.

McCain is not relevant to the claimed process. The aim of McCain is to provide a catalyst composition which produces predominantly acetic acid from ethane and/or ethylene, i.e. a process which is selective to acetic acid (col. 3 lines 7-8). McCain is not interested in ethylene as a product. McCain discloses that the solution to achieving selectivity to acetic acid is to use a mixture of two catalyst species (col 3. lines 58-61), At col. 1 lines 45-48, McCain states that U.S. patent 4,524,236 does not suggest or disclose mixed catalyst compositions for selective acid production.

Manyik does not cure the above-noted deficiencies of McCain. Manyik relates to a process for the conversion of ethane only to ethylene. The process is multistage, such that ethane is reacted with oxygen in the presence of a catalyst to produce an output stream comprising ethylene, acetic acid, water and unreacted ethane and oxygen. The composition of this output stream is altered by adjusting the amount of acetic acid and/or water in the stream (col 1 tines 32-48; claim 1). Manyik is not interested in acetic acid as a product. The aim of Manyik is to produce ethylene as a product. At col. 6 lines 61-63, Manyik states that the preferred catalysts for use in the invention are those described in U.S. patent 4,524,236.

McCain, in essence, discloses how to be selective to acid, whereas Manyik describes the contrary, i.e. how to obtain predominantly ethylene product. Thus, the

disclosures of McCain and Manyik are diametrically opposed, and one of ordinary skill would not have been motivated to combine their teachings. In fact, the preferred catalysts for use in the process of Manyik (i.e. those of U.S. patent 4,524,236) are stated by McCain as not being able to achieve the invention of McCain.

In the present invention, the concentration of alkene reactant is controlled such that the product molar ratio can be tailored. McCain is silent on varying the concentration of ethylene reactant or any effect thereof, and Manyik describes only ethane as a reactant. Thus, a combination of these two disclosures, which it is contended the skilled person would not make, would not enable the skilled artisan to arrive at the presently claimed invention.

Contrary to the Examiner's assertion on page 4 of the official action, ethylene is indeed an optional reactant and not a required reactant. Col 3 lines 7-8 states that the reactants are ethane, ethylene or mixtures of ethylene and ethane. Thus, ethane may be a sole reactant.

Based on the above it is clear that one of ordinary skill would not have been motivated to combine the McCain and Manyik disclosures and, even if those disclosures had been combined (it is believed that would not have occurred), the presently claimed invention would not have resulted or have been rendered obvious thereby. Withdrawal of this obviousness rejection is respectfully requested.

The second obviousness rejection over the combined disclosures of Fisher and Manyik likewise must be withdrawn. Fisher relates to the purification of vinyl acetate by removal of methyl acetate and ethyl acetate impurities. The vinyl acetate is produced by reacting ethylene, acetic acid and oxygen in the presence of a catalyst. Manyik is

directed to producing ethylene via a multistage process (claim 1). In a first stage, ethane reactant is converted to a mixture comprising ethylene, acetic acid, unreacted ethane and unreacted oxygen. The composition of this product stream is then adjusted by altering the amount of water and/or acid contained therein prior to a second catalytic stage to produce product ethylene. Manyik is completely silent on any suggestion of controlling ethylene reactant concentration to tailor acid and ethylene product ratio. Fisher is directed to distillation and extraction processes to remove acetate impurities from vinyl acetate. Thus, as neither Fisher nor Manyik provides any disclosure or suggestion on how to tailor the acid to ethylene product ratio via controlling ethylene reactant concentration, the person of ordinary skill could not arrive at the subject-matter of claims 2, 3 and their dependent claims by a combination of Manyik and Fisher. Clearly, the combined disclosures of Fisher and Manyik do not give rise to a *prima facie* case of obviousness in this case.

Withdrawal of the outstanding obviousness rejections is now believed to be in order. Such action is respectfully requested.

Allowance of the application is awaited.

Respectfully submitted,

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